DATE: AUGUST 1, 1997

TO: REGIONAL TRANSPORTATION DIRECTORS
PROGRAM ENGINEERS

FROM: J. E. SIEBELS

SUBJECT: IMPLEMENTATION OF DESIGN-BUILD GUIDELINES

The attached Design-Build Guidelines are to be used when developing design-build projects which are based on the current bidding requirements for determining the low, responsible bidder. They were developed in cooperation with FHWA, The American Consulting Engineers Council of Colorado, and the Colorado Contractors Association.

CDOT's philosophy on design-build is based on the premise that the traditional design-bid-build process is the preferred method of accomplishing the Department's program; however, circumstances may require the use of alternative methods for project delivery.

Design-build is the combining of the design and construction phases of a project into a single contract. Under this concept, the Department will prepare plans and specifications at an incremental level of completion (20-90%) rather than a 100% design. The approach allows for flexibility and could include preliminary plans for all or a portion of various project features. As a minimum, the design-build project is to be at the Field Inspection Review (FIR) level. This is typically 20% to 30% complete.

Design-build plans must clearly describe the scope of work. This will define the Contractor's requirements and responsibilities for the design and construction, define applicable standards, describe work completed by the State, and list documents relative to the project.

Both the Region and Staff support efforts will have to be modified to support the design-build process:

* Engineer's estimates will have to be based on an overview of the various items such as earthwork, traffic control, paving quantities, etc., rather than the nominal individual bid items.

* DBE participation will have to be determined based upon broad subjects also rather than individual bid items.

* Field surveys may possibly concentrate on those areas of the project that need special attention:

* The advertisement and award period may have to be lengthened from the normal process.

* The bidding and award process will have to be changed so that the design and construction methods can be evaluated as well as the bid.

The development of these Design-Build Guidelines is based on current bidding requirements for determining the low, responsive bidder for a project. The development of guidelines utilizing the RFP process including short listing and selection based on best proposal is currently being pursued.

cc: Branch Managers
Federal Highway Administration
American Consulting Engineers Council
Colorado Contractors Association

COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN-BUILD GUIDELINES

I. SCOPE OF WORK

The scope of work for the design-build project should be clear and complete, including any information, data, and services to be furnished by the Department.

The scope shall furnish sufficient information upon which Contractors may prepare bid proposals (i.e., technical and price proposals).

A. Preliminary Design

The preliminary design should clearly state the specifications, design criteria and standards that shall be used in the final design and construction of the project. CDOT procedures for selecting metric design projects are to be used.

The design requirements with specifications are essential to ensure that the project is constructed to meet the needs as determined by the Department. The following guidance is considered the minimum requirements that should be included in the preliminary design plans.

1. Bridge project requirements may include but are not limited to alignment, prescribed typical section elements, design criteria, design guidelines, aesthetic requirements, project schedule, standard detail drawings, subsurface soil data, minimum vertical and horizontal clearance requirements, hydraulics, scour predictions.

2. Roadway project requirements may include but are not limited to alignment, project limits, prescribed typical section elements, design controls and criteria, controlling roadway and traffic design standards, project schedule, drainage, pavement design, traffic control plan design, bicycle and pedestrian designs, including ADA requirements, and controlling access management standards.

The following are examples of other information that might be necessary for the Department to provide in order to clarify the scope of work:

- Preliminary geotechnical survey including bridge boring, wall boring, and roadway boring (within the limits of the possible alignments).

- Sites specific information that could potentially affect or restrict the Contractors allowable construction methods and cost.

    - Survey showing limited of contaminated sites within the right-of-way which potentially affects excavations such as building bridge piers and drainage structures.

    - Limits of wetlands.

    - Asbestos survey on project.

    - Lead paint containment.

    - Etc.

B. Utilities

CDOT should determine what utilities are present and what utility efforts may be required. The plans should clearly specify all utility efforts required of the Contractor. It is expected that CDOT’standard practices in coordinating with utility companies will be used and included in the plans.

C. Permits

The Department must determine who will be responsible for permits and how the coordination process will be handled. The scope will clearly state when the Contractor is to be responsible for identifying and obtaining all required permits.

Permit requirements, especially those affecting the Contractor’s construction options and cost should be identified prior to the Contractor preparing the

technical proposal. CDOT should determine up front what will not be permitted for the project. This does not alleviate the Contractor's responsibility to acquire the necessary permits or to modify existing permits as necessary.

D. Design Plans and Engineering Calculations

The plans shall clearly define any documentation (including but not limited to design plans, shop drawings or engineering calculations) that is to be received by the Project Engineer. Under design-build, these submittals are not for the Department's approval, but rather for verification of compliance with specified criteria.

The plan shall also clearly state any requirements for submittals and backup information that the Department desires.

E. Environmental Assessment Process

The Department will be responsible for the environmental input study and obtaining permits. The plans should include provisions for any specific requirements.

F. Easements/Right-of-Way

The plans should identify existing right-of-way and easements. Right-of-way should be cleared prior to advertising the projects.

The plans should note that the Contractor is responsible for any land rental for construction equipment, material stockpiles and staging areas.

G. Existing Project Features

The plans should include provisions for any specific requirements for demolition and disposal or retainage of existing features.

H. Survey Requirements

CDOT should specify any survey information required and advise bidder of the existing survey information that is available.

CDOT will need to perform some survey work in the preparation of the plans. CDOT should determine the extent of the survey control for layout. All survey would/should adhere to the Department's Survey Manual.

I. Traffic

Traffic control plans will vary depending on the scope of the project, but may include work zone traffic control plans, traffic signal plans, pavement marking plans and permanent signing plans. Following are examples of information that might be necessary for the Department to provide in order to clarify the scope of work.

- Work Zone Traffic Control

  Information might include worktime restrictions including those involving time of day, days of the week and area special events. Allowable closures/detours including maximum number of lane closures, restrictions of vehicle weight-width etc., and minimum design speed allowed. Any special devices desired beyond those required by the MUTCD such as sign sheeting material, variable message signs and arrow boards.

- Traffic Signal

  Information might include desired signal phases, detection design, type of signal poles, mast arm lengths, number and size of signal heads per approach, color of poles desired, coordination/interconnection requirements and signal timing for start up. Any requirements for future operation needed should be identified as well as disposition of salvaged materials for signal rebuilding projects.

- Pavement Marking

  Information might include type of marking material.

- Permanent Signing

  It is recommended that plans be developed to the point that they include sign layouts, desired traffic controls and location of controls and overhead sign requirements.

J. DBE Goals and Requirements

The plans should address the Departments' goal requirements for DBE utilization for the project. Because the Contractor may be proposing varying alternates, the goal determinations should be carefully assessed.

K. Subcontracting

Subcontracting should be allowed in accordance with current CDOT requirements.

L. Final Documents

The plans shall clearly define the final documents required by the Department from the Contractor upon completion of the project. These should include: as-built final plans (100% automated), engineering reports, shop drawings, test results, documentation, daily reports, etc.

M. Project Time/Schedule

The amount of time available for Contractor/Consultant team organization, preparation of qualifications statements and design-build proposals is critical to those proposing on the project. Sufficient time needs to be allowed for the Contractor's team to evaluate and prepare a responsive bid.

Consideration for a delayed start time on the project should be given in order to allow the Contractor time to begin the final design process in order to get out ahead of start of construction. The plan preparation time must be clearly identified in the plans.

It may be appropriate to allow certain construction activities (such as clearing and grubbing or construction surveying) during the plan preparation period. Specifics should be addressed in the plans.

II. PROPOSAL/AWARD

A. Advertisement

The Department should make every effort to provide more notice than the typical 3-week Ad period to the Contractors and Consultants of the proposed design-build projects. This early notification of the type of project will allow for firms interested in proposing to establish teams early in the process. First notice of projects which will be accomplished using design-build techniques will be in the CDOT Blue Sheet. If FIR level plans (approximately 20-30% complete) are prepared by CDOT, the formal Ad period should not be less than six weeks. If less complete designs are provided, the formal Advertisement period should be extended.

B. Prequalification Requirements

All designs must be completed by a Professional Engineer registered in the State of Colorado. The design firm included on the design-build team must be listed on CDOT's list of Prequalified Consultants. CDOT will reserve the right to use more selective prequalification processes if warranted by specialized technical elements of a project. All consultants will be required to provide project-specific professional liability insurance with limits to be specified on a project-specific basis.

The construction contractor must be prequalified by CDOT. A joint venture of a design firm with a construction firm must be prequalified as a joint venture, have a separate taxpayer number, and there must be an agreement specifying which partner has authority to execute contracts on behalf of the joint venture. CDOT would need to review the joint venture agreement to ensure proper submittal of the bid and proper execution of the contract.

C. Prebid Conference

Regardless of the size of project being proposed, all design-build projects should include a prebid conference. It is recommended that the prebid conference be mandatory. This conference should be held at approximately the one-third point of the formal Advertisement period.

D. Proposal Requirements

All proposers will be asked to develop and submit proposals based on the bidding pacakage provided by CDOT. Proposals will include both a Technical Proposal and Price Proposal being submitted at the time of bid opening. The Price Proposal will be used to determine the apparent low bidder. A CDOT Technical Review Committee (TRC) will determine if the Technical Proposal of the low bidder complies with the requirements of the bidding package and if the combined proposal is responsive. The TRC will recommend acceptance or rejection of the proposal. Technical proposals of bidders other than low bidder is determined to be nonresponsive.

E. Technical Proposal

The Technical Proposal shall always include a project schedule to show start/completion dates and milestones in project development in order to demonstrate constructability, and may include other information as requested in the bidding package. Examples of other information which may be requested to be included in the Technical Proposal are: preliminary design calculations, quality control plan, maintenance of traffic provisions, and the experience and capabilities of the designer with respect to the particular type of project work. Two hard copies of the Technical Proposal are required. One copy will be retained as a Record Set and the second will be used to make copies for review by the TRC.

F. Price Proposal

Price Proposal will typically be one lump sum for all design and construction of the proposed project. The State's Request for Proposals may include a combination of unit prices for State-provided estimated quantities plus lump sum prices. This combination may be necessary for projects involving rehabilitation work with very uncertain quantities. (See Section III.G. of these Guidelines for information on measurement and payment during construction.) Bidders who have performed design work before award, and do not get the award will have performed that work at their sole cost and the cost of that design work will not be reimbursed by CDOT.

G. Technical Review Committee (TRC)

A project-specific CDOT Technical Review Committee (TRC) will need to be established to evaluate the Technical Proposal to determine acceptance or rejection of the proposal.

There should be a minimum of people comprising the TRC: the Regions' Construction Engineer, the Regions' Design Engineer, and a CDOT project representative. Review of the Technical Proposals will be coordinated by the CDOT Award Officer. For bridge projects, the TRC shall also include the CDOT or CDOT's consultant structural design engineer.

The documentation submitted by the apparent low bidder will be analyzed by the TRC. The TRC may contact the apparent low bidder and discuss any apparent deficiencies in the Technical Proposal. The Contractor will be allowed 7 calendar days after date of contact and discussion to submit to the TRC any additional information to determine the apparent low bidder. A CDOT Technical Review Committee (TRC) will determine if the Technical Proposal of the low bidder complies with the requirements of the bidding package and if the combined proposal is responsive. The TRC will recommend acceptance or rejection of the proposal. Technical Proposals of bidders other than the low bidder will not be opened unless the low bidder is determined to be nonresponsive.

H. Award

As a general rule, price will be the only selection criteria on projects where the scope is very tight, clearly defined and innovation or alternatives are not being sought. This might include bridge projects with a specified foundation type, span lengths, and beam types.

The TRC will review the Technical Proposal of the lowest bidder in order to assess the responsiveness of the proposal. A bid proposal is considered nonresponsive if it does not contain all the information and level of detail requested in the bidding package. It may be appropriate for the TRC to then review the next lowest bidder's Technical Proposal to determine its responsiveness.

Additional time needs to be provided in the award process to allow for the submittal and review of the Technical Proposal. The bidding package should provide that standard 30 day award period will be extended to at least 60 days in the event the apparent low bidder is determined to be nonresponsive and a review of a second bidder's Technical Proposal is required. The potential award period should be extended to 90 days if the project involves multiple structures.

When CDOT determines that completion of a project or a portion of a project is critical to reduce road-user delay costs, the design-build process may include a bid adjustment for the value of time. This adjustment is based on the Contractor's proposed number of days to complete the project or to achieve a significant project milestone. The proposed number of days is multiplied by a value per day established by the Department (number of days times $/day = Price Proposal adjustment (increase)). The Department shall establish the cost/day value and include it in the plan. The Contractor will determine the contract time necessary to perform all design-build functions. Using zero base line, the Contractor shall multiply its contract time by the cost/day contained in the plan package. This value added to the Price Proposal will constitute the time adjusted price. Below is an example of how this selection process would work using $2,000/day:

Contractor	Contract Time (Days)	Time Value (Days X $/Day)	Price Proposal	Time Adjusted (Time Value + Bid Amount)
A	300	$600 K	$6.7 M	$7.3 M
B	250	$500 K	$6.5 M	$7.0 M
C	400	$800 K	$6.3 M	$7.1 M

In the example above, Contractor B would be awarded the contract based on the lowest time adjusted price. If the value of time factor is used, it is recommended that an incentive/disincentive provision be included in the contract with a dollar amount per day equal to the value of time factor amount. This will create a more level playing field and keep the Contractor from playing with the proposed contract time.

III. CONSTRUCTION MANAGEMENT

Under the design-build process, the Contractor manages design of the project, making the Designer of record directly responsible to the Contractor rather than CDOT's Engineer.

The Designer of record must accommodate its' client for the design - the Contractor - and how the Contractor intends to construct the project. For example, the column size may be changed to accommodate forms the Contractor has available. Pier spacing on a bridge may change to reflect the Contractor's availability of falsework material.

A. Design/Construction Standards

The plans should reference all applicable Department specifications, including standard specifications, supplemental and special provisions as deemed appropriate. In addition, standard drawings, manuals, including MUTCD, AASHTO, etc., that are appropriate for either design or construction should be referenced that would be pertinent to the specific project.

Standard Special Provisions shall address any QC/QA specifications, and smoothness or other requirements.

The plans should address if there are any particular construction processes or techniques that need to be specified in order to satisfactorily construct the project.

B. Design Plans/Engineering Calculations

The Contractor should submit final plans, progress and payment schedules, itemized quantity and cost breakdowns in accordance with the plans. The final package should include complete design calculations and design check calculations.

The Contractor should submit two record sets of plans with design notes and computations to the Engineer one week prior to construction of that portion of the particular feature (i.e., footer, pier, abutment, etc.). Under design-build, these submittals are not for the Department's approval, but rather for verification of compliance with specified criteria.

The record sets are to include the endorsement seal and signature of the Professional Engineer in responsible charge of the design and preparation of the plans.

C. Quality Control (QC) Requirements

The Contractor shall be responsible for Quality Control inspection and testing.

The plans should address any QC requirements that the Contractor must follow which are in addition to those already in the reference specifications, policies, and procedures. The Contractor should be required to provide a Quality Control Plan (QCP), which outlines details of inspection and testing to control quality products (plans, construction, etc.).

Quality Assurance (QA) is the responsibility of CDOT. QA consists of all the sampling, testing, and inspection necessary for CDOT to assure conformance with the contract requirements.

D. Construction Problem Resolution

The plans should clearly define the process to be used to "fix" any construction problems that arise - such as piling driven out of tolerance or wrong elevation on piers, caps, etc. The construction resolution process should be as follows:

- If the resolution does not change the original intent of the Technical Proposal/plan, then the Engineer of Record, who works for the Contractor, will be responsible for developing the design solution to the construction problem and the Engineer will be responsible for review and concurrence.

- If the resolution does alter the original intent of the Technical Proposal/plan, then the Engineer of Record will develop the proposed solution, and the Contractor will submit this change to the Engineer for review and approval.

- The plans should include an issue escalation matrix or process which clearly defines the process for addressing questions of disagreements that may arise. The process should show the chain of command to resolve design issues.

- It is recommended that partnering be used on all design-build projects in order to enhance teamwork.

E. Survey Requirements

The plans should identify any preliminary survey information to be provided by the Department.

The Contractor shall be responsible for all costs relating to construction surveying and survey monumentation.

It may be necessary for the Department to perform some survey work in the preparation of the project plans.

F. Warranties - Incentives/Disincentives

At this time the use of warranties is not recommended on design-build projects. There are many issues yet to be resolved regarding warranties.

The use of incentives/disincentives should be limited to those items identified by CDOT and within the material specifications as established. The incentive/disincentive pay schedule is based on long term performance and should not be altered.

G. Method of Measurement/Basis of Payment

Design-build work is not to be measured, but will be paid for on a lump sum basis.

The lump sum bid will be full compensation for all the cost of the work, materials, tools, equipment, and incidentals required to complete the design, QC testing and inspection, and construction of the project. Any supplemental work such as construction surveying, survey monumentation, or foundation investigations are included in the work.

The Contractor should be required to furnish a payment schedule which includes an itemized quantity and cost breakdown of the lump sum bid to the Engineer. In additiion to the standard itemized quantities, the Contractor shall also provide on separate breakdown for the proposed Consultant design work (payout schedule). The Contractor’s approved itemized quantity and cost breakdown will be the basis for progress payments, testing requirements, and price adjustments.

No adjustments are made for differences in preliminary estimated quantities and final quantities.

CDOT requested changes can be extremely expensive, therefore, the scope of work should be clear and complete. During the bid process the Contractor must develop a critical path in order to design and construct the project. Such changes tend to result in long, difficult negotiations.